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FIG. 1

90 GCCAAGAGTCCGAGGATCCAGTGGACGAAGGTGTTGGGGCTGGGGCTGGGGCTGCTGCCCTCTTGGGGCTGGGGATCATCTCGGCCA
M Q W T K V L G L G L G A A A L L G L G I I L G H

180 CTTTGCCATCCCCAAAAGCCAACTACCTGGCCCCCAGGACCTGGACCTGGAGATCTTGGAGACCGTCAATGGGGCAGCTGGATGCCCA
F A I P K K A N S L A P Q D L D L E I L E T V M G Q L D A H

270 CAGGATCCGGGAGAACCTCAGAGAACTCTCCAGGGAGCCACACCTGGCCCTCCAGCCCTCGGGATGAGGACCTGGTGCAGCTGCTGTGCA
R I R E N L R E L S R E P H L A S S P R D E D L V Q L L L Q

360 GCGTGGAAAGGACCCAGAGTCAGGCCTGGACTGGCCCGAGGCCCTNACGTCAGAAAGTGTGCTGTCTTCCCTAGCCAGGAGCAGCCCAA
R W K D P E S G L D S A E A X T Y E V L L S F P S Q E Q P N

450 CGTCGTGACATCGTGGGCCCCACTGGGGGCATCATCCACTCTCCACCGGACTGAGGAGAACCTGACCCGGGGAGCAAGGGGGGCCAGA
V V D I V G P T G G I I H S C H R T E E V T G E Q G G P D

540 TGTGTACAAACCCTATGCTGCTTCTTGTGGAACCCACAGGGCCCTCTGCTATGCCAACCCGGGGCGGGAAGAAAGACTTTAA
V V Q P Y A A Y A P S G T P Q G L L V Y A N R G A E E D F K

630 GGAGCTACAGACTCAGGGCATCAAACCTTGAAGGCACCATTTGCCCTGACTCGATATGGGGTGTAGGGCGTGGGGCCAAAGCTGTGAACGC
E L Q T Q G I K L E G T I A L T R Y G G V G R G A K A V N A

720 TGCCAAAGCAGGGGTAGCTGGGTGCTGTGTACACAGACCCCTGCCGACATCAACGATGGGCTGAGCTCACCCGACGAAACCTTTCCCAA
A K H G V A G V L V Y T D P A D I N D G L S S P D E T F P N

810 CTCCTGTACTGCCCCCTCAGGAGTGGAGCGAGGCTCCTACTAGAGTATTTTGGGACCCCTTGACTCCCTACCTTCCAGCCGTCCTCC
S W Y L P P S G V E R G S Y Y E Y F G D P L T P Y L P A V P

900 CTCTTCTTCCCGTGGACCTTGCCCAATGCTCCGGAATTTCCCAATTTCTTACACAGCCCATTTGGCTTCCAGGATGCAAGAGACCTGCT
S S F R V D L A V S G F P P I P T Q P I G F Q D A R D L L

990 CTGTAACTCAACGGAACTTTGGCCCCCAGCCACTGGCAGGGAGACCTGGGCTGCCACTACAGTTGGGTCCCGGCTTCCGGCCCTGACGG
C N L G T L A P A T W Q G A L G C H Y R L G P G F R P D G

1080 AGACTTCCACAGACAGCCAGGTGAATGTAGCGTCTACACACCGCTGGAGCTGAGGAACCTTTCCAACGCTCTGGGATCATCTCGTGG
D F P A D S Q V V S V Y N R L E L R S S N V L G I I R G

1170 GGCTGTGGAGCCTGATCGCTGTATGGGAACCAACGAGACAGCTGGGTGACGGGGCTGTGGACCCAGCAGTGGCACCCGCGT
A V E P D R Y V L Y G N H R D S W V H G A V D P S S G T A V

FIG. 1 (CONTINUED)

1260 CCTCTGGAGCTCTCCCGTGTCTGGGGACCCCTGCTGAAGAAGGGCACCTGGCGTCTCGAGATCAATCGTGTTCGGAGCTGGGGGGC
L L E L S R V L G T L L K K G T W R P R S I V F A S W G A

1350 TGAGGAGTTTGGGCTCATTTGGCTCCACGGAATTCACAGAAGAGTTCTTCAACAAGCTGCAGGAGCGCACGGTGGCCCTACATCAACGTGGA
E E F G L I G S T E F T E E F F N K L Q E R T V A Y I N V D

1440 CATCTCGGTGTTGCCAACGCTACCCCTTAGGGTGCAGGGGACGCCCCCTGTCCAGAGCGTCTTCTCTGCAACCAAGAGATCCGCTC
I S V F A A T L R V Q G T P P V Q S V V F S A T K E I R S

1530 ACCAGGCCCTGGCGACCTGAGCATCTACGACAACCTGGATCCGGTACTTCAACCGCAGCAGCCCGGTGTACGGCCCTGGTCCCCAGCTTGGG
P G P G D L S I Y D N W I R Y F R S S P V Y G L V P S L G

1620 TTCTCTGGGTGCTGGCAGCGACTATGCACCCCTTCGTTACITTCCTGGGCATCTCCTCATGGACATTCCTTATACCTATGACCCGAGCAA
S L G A G S D Y A P F V H F L G I S S M D I A Y T Y D R S K

1710 GACTTCAGCCAGGATCTACCCACCTTACACACAGCCTTTGACACCTTTGACTATGTGGACAAGTTTTCGACCCCGGCTTCAGCAGCCA
T S A R I Y P T Y H T A F D T F D Y V D K F L D P G F S S H

1800 TCAGGCTGTGGCCCGACAGCGGGGAGTGTGATTCTCCGGCTCAGTGACAGCTTCTTCTGCCCCCAAGTCAAGTCAAGTACAGTGAGAC
Q A V A R T A G S V I L R L S D S F F L P L K V S D Y S E T

1890 ACTCCGCAGCTTCTTCAGGCGACCCAGCAAGATCTTGGGGCCCTGCTGGAGCAGCAGCAGCATCAGCCCTGGGGCCCTCTGGTGACTGCAGT
L R S F L Q A A Q Q D L G A L L E Q H S I S L G P L V T A V

1980 GGAGAAGTTTGAGGCAAGAAGCTGCAGCCTTGGGCCAACGCATATCAACACTGCAGAAGGGCAGCCCTGACCCCTGCAGGTCCGGATGCT
E K F E A E A A L G Q R I S T L Q K G S P D P L Q V R M L

2070 CAATGACCACTTGATGCTTTGGAACGGACCTTTCTGAACCCCTAGAGCCCTTCCAGAGGAACGCTACTACAGCCATGTGCTCTGGGCACC
N D Q L M L L E R T F L N P R A F P E E R Y Y S H V L W A P

2160 TTCGCACGGGCTCCGTAGTCACATTCGGGGCTATCCAAATGCCTGCTCCAGGGCCAGGACACAGCTTCTCGATCTGAAGCTTGGGCTGA
S H G L R S H I P G L S N A C S R A R D T A S G S E A W A E

2250 GGTCAGAGACAGCTCAGCATTTCTGGTGACAGCCCTTGAGGGTGGCGCAGCCACCCCTGAGGCCCTGTGGCTGACCTCTGACCCCGCCCTC
V Q R Q L S I V V T A L E G A A A T L R P V A D L .

2320 TTYCTTCAGCCCTCCCTTTACTCCGGTCTTATATTACAAAGTGCTTTGTGTTTTTAAAGTCTTTT

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FIG. 2.

human	NCMTKVLGLGLGAAALLGLGIILGHFAIPKANS	LAP-----	QDLLEILETVHGQDAAHRIRENLRSLREPHLASS	PRDEDLVQLLLQ	: 85
rat	HHMAKILCVGIGAAALLGLGIILGHFAIPHATEP	LSSVSDS	QDLLEILDSVHGQDASRIRENLRSLREPHVATS	ARDEALVQLLLG	: 90
human	RUKDPESGLDSMEAXTTEVLLSPSPCEQPMVMDIVGPTGG	IHSCHRTEENVTCGCGPDVVQPYAAVAPSGTPCG	LLVYANRGAEEDFN		: 175
rat	RUKDSASGLDTAKTYENTVLLSPSPTEQPMSEVVGPNCTVFHS	FQPFERNLTGCEAEPNVLPQPYAAVAPSGTFKGP	LLVYANRGSEDDFF		: 180
human	ELCTQGIKLEGTIALTRYCGVGRGAKAVNAAKHGMAGVLVYTD	PADINDGLES	PDFTFPNSM	YLPSPGVERGSYYEYFGDPLTPYLPAPV	: 265
rat	KLEAEGINLKGTIALTRYCGVGRGAKAINAARHGVMGVLVYTD	PCDINDGKSL	PNFTFPNSM	CLPPSGVERGSYYEYFGDPLTPYLPAPH	: 270
human	SSFRVDLANVSGFPPIPTQPIGFQDARDLLCNLNGTLAPATU	QGALGCHYRLGPGFR	PDGDFP	DSQVNVSVYNRLRLRNSNVLGIIIRG	: 355
rat	VSRFLDPHNSGFPPIPTQPIGFEDAKVLLCNLNGTSAPDSU	QGALGCEYKLGPGFE	PNGNFPAGSEV	KVSVYNRLRLRNSNVLGIIICG	: 360
human	AVEPDRYVLYGNHRDSUVHGAVDPPSSGTAVLLELSRVLGTL	LKKGTURPRRSIVFASUGAE	EFGLGISTEFT	EEFNKLOERTVAYINVD	: 445
rat	AVEPDRYVLYGNHRDSUVHGAVDPPSSGTAVLLELSRVLGTL	LKKGTURPRRSIVFASUGAE	EFGLGISTEFT	EEFLSKLOERTVYINVD	: 450

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FIG. 2. (CONTINUED)

human : 535
 rat : 540

ISVFANATLPVQGTTPVQSVVFSATKEIRSPGPGDLSIYDNUAIRYFNRSSPVYGLVPSLGSAGSDYAPFVHFLGISSHDLAYTYDRSK
 ISVFSNATLPVQGTTPVQSVVFSATKEISAPGSSCLSIYDNUAIRYFNRSSPVYGLVPSNGTLGAGSDYASFIFHLGITSHDLAYTYDRSH

human : 625
 rat : 630

TSARIYPTVHTAFDTFDYVDKFLDPGFSSHQAQAVARTAGSVILRLSDSIFLPLKWSYDSETLRSFLQAQODLGALLECHESISLGPLVTAV
 TSARIYPTVHTAFDTFDYVTEKFLDPGFSSHQAQAVARTAGSVLLRLSDSLFLPLNWSYDSETLQSFLQAQENLGALLESHNISLGPLVTAV

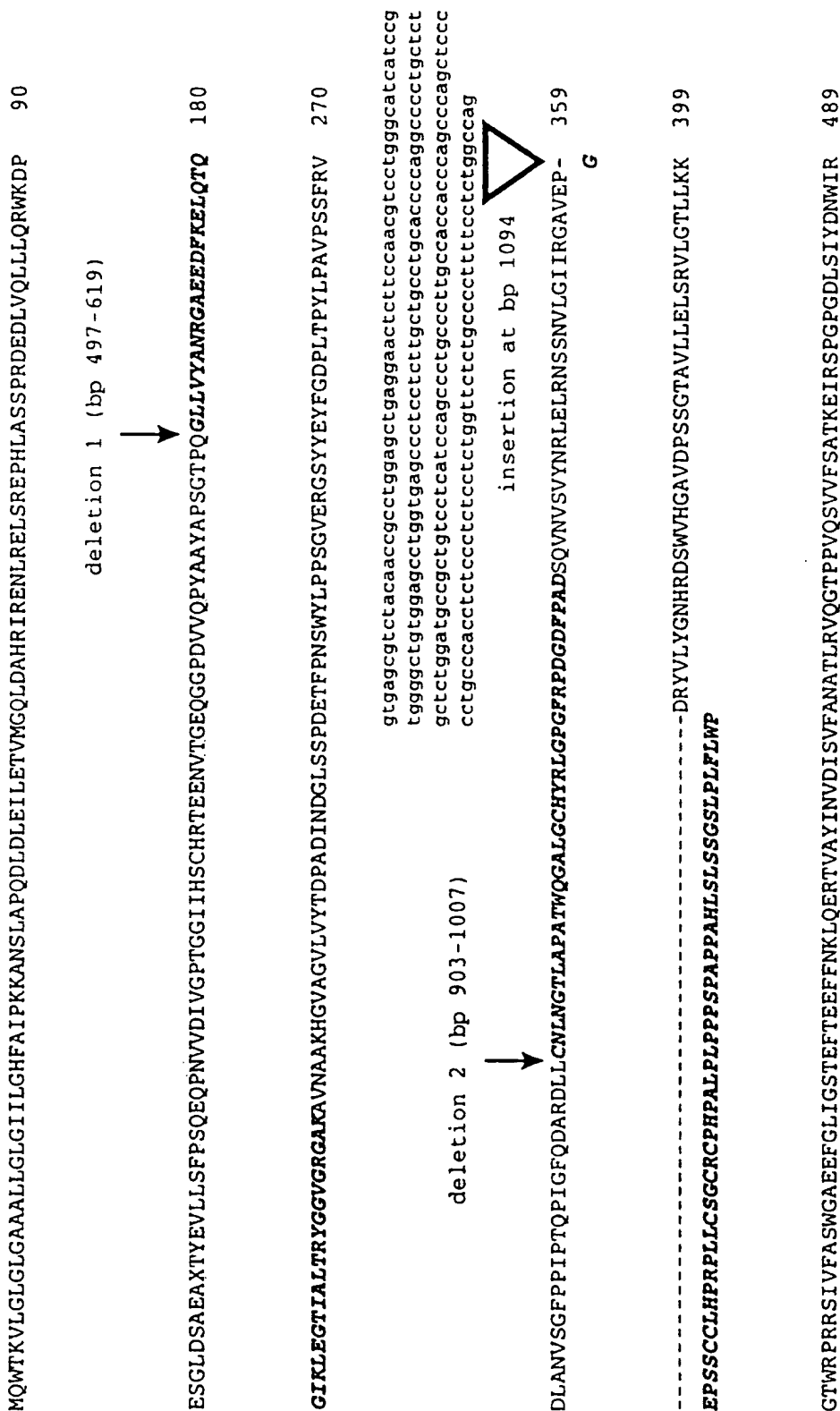
human : 715
 rat : 720

EKFEAEAAALCCRIJSTLQKSPDPLOVRHMLNDQLHLEFTFLNPRAPFPEERYSHVLWAPSHGLRSHIPGLSNACSRARDTASGSEAAAE
 EKFKAAALNQHILTLQKSPDPLOVRHMLNDQLHLEFTFLNPRAPFPEERYSHVLWAPNTASVATFPGLANPYARAEINSGAEAAAE

human : 740
 rat : 745

MQRQLSIVTALGEGAAATLRPVADL-- : 740
 MERQLSIATVHALGEGAAATLCPTVDL-- : 745

FIG. 3.



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FIG. 3. (CONTINUED)

deletion 3 (bp 1525-1615); deletion 4 (bp 1525-1615)

gtgaggaggagacaaaggggcatcctgagaccaggacaggagagggctgaagactgagccctggccctgtcaccttgccgcag
 insertion at bp 1697
 YFNRSSPVYGLVPSLGLGAGSDYAPFVHFLGISSMDIAYTYDRSKTSARIYPTYHTAFDTFDYVDKFLDPGFSHQAVARTAGSVILRL 579
 RLQPSGCGPDSGECDSPAQ*
 RARLQPGS PPTTQPLTPLTMTSFWTRASAAIRLWPQRGV*

gtaggcacagccctgacccctgaggtatggggagccctgcaccccatgactgagccactgctgttctccacag
 insertion at bp 1870
 SDSFFLPLKVSDYSETLRSFLQAAQQDLGALLEQHSISLGLPLVTAVEKFEAEAAALGQRISTLQKSPDPLQVRMLNDQLMLLERTFLNP 669
 GMHSPDPEVWGALHPHD*

RAFPEERYYSHVLWAPSHGLRSHIPGLSNACSRARDTASGSEAWAEVQRQLSIVVTALEGAATLRPVADL* 740

FIG. 4.

90 CTCAAGAAGCCATGCGGAATCCAGGGGCGCTCTGTACCTTTGGATGTGCTGGCTGGCATCTTTCCTCATGGATTTATGG
 M A E S R G R L Y L W M C L A A A L A S F L M G F M V
 180 TGGCTGGTTTATTAAAGCCTCTCAAAAGAAACAACCACTTCTGTGCGCTATCATCAAGTATACGGTGGAACTGGTATCCGAAATGAAAG
 G W F I K P L K E T T T S V R Y H Q S I R W K L V S E M K A
 270 CTGAACATCAATTCATTTCTTCGTTCTTTTACAAGCTTCTCATCTGGCAGGACAGACAAAATTTCTTGCTTGCCAAAGAAAATCC
 E N I K S F L R S F T K L P H L A G T E Q N F L L A K K I Q
 360 AAACCCAGTGGGAAGAAATTTGGACTAGATTCAGCCAAGTTGGTTCATTTATGATGTCTCTTATCTTACCCCAATGAGACAAATGCCAACT
 T Q W K K F G L D S A K L V H Y D V L L S Y P N E T N A N Y
 450 ATATATCGATTGTGGATGAACATGAACTGAGATTTTCAAAACATCATACCTTGAAACCAACCAGATGGCTATGAGAAATGTTACAATA
 I S I V D E H E T E I F K T S Y L E P P P D G Y E N V T N I
 540 TTGTGCCACCATAAATGCTTTCTCAGCCCAAGGCATGCCAGAGGAGATCTTGATATATGTGAACATGTCTGGCACTGAAGACTTTTCA
 V P P Y N A F S A Q G M P E G D L V Y V N Y A R T E D F F K
 630 AACTAGAAAGAGAGATGGGCATCAACTGTACTCGGAAGATTGTTATTCGAAGATATGGAATAATTTCAAGGAAATAAAGTTAAATAATG
 L E R E M G I C T G K I V I A R Y G K I F R G N K V K N A
 720 CCATGTAGCAGAGCCATAGGAATCATCTTGTAATCAGATCCAGCTGACTACTTTTGCTCTGAGTACAGCCATATCCCAAAGGATGGA
 M L A G A I G I I L Y S D P A D Y F A P E V Q P Y P K G W N
 810 ATCTTCTGGAAGTCCAGCCAGAGAGGAATGTTGTTAAATTTGAATGGTGGTGACCCACTACTCCAGGCTATCCAGCAAAAGAAT
 L P G T A A Q R G N V L N L N G A G D P L T P G Y P A K E Y
 900 ACACITTCAGACTTGATGTGAAGAGGAGTGGGAATCCCCCGAATACCTGTACATCCCATGGATATTAATGATCCAGAAATATTATTAC
 T F R L D V E E G V G I P R I P V H P I G Y N D A E I L L R
 990 GCTACTTGGGAGGAATTGCTCCACCAGATAGAGTTGGAAGGGAGCCCTTAATGTGATGTTATAGTATCGGACCTGGCTTTACAGGGAGTG
 Y L G G I A P P D K S W K G A L N V S Y S I G P G F T G S D
 1080 ATCTTTTCAGGAAGGTTAGAATGCATGTTTATAACATCAATAAATTACAAGGATTTACAATGTAGTTGGAACATATCAGAGGATCTGTGG
 S F R K V R M H V Y N I N K I T R I Y N V V G T I R G S V E
 1170 AACCTGACAGGTATGTTTCTGGAGGTACCGGAGTCTCGGTATTTGGAGCTATTTGACCAACCAAGTGGGGTTCCTGTTTGGCAAG
 P D R Y V I L G G H R D S W V F G A I D P T S G V A V L Q E

FIG. 4. (CONTINUED 1)

1260 AAATTGCCGGAGTTTGGAAAACTGATGAGTAAAGGCTGGAGACCTAGAAGAACTATCATTTTGGCCAGCTGGGATGCAGAAGAAATTG
 I A R S F G K L M S K G W R P R T I I F A S W D A E E F G
 1350 GACTTCGGGTTCCACAGAAATGGGCTGAGGAGAAATGTCAAAATACTCCAGGAGAGAGCAATTGCTTTATATCAACTCGGATTCATCTATAG
 L L G S T E W A E E N V K I L Q E R S I A Y I N S D S S I E
 1440 AAGGCAATTATCTCTCAGAGTTGACTGTACTCCCTTCTTTACCAAATTAGTGTATAAACTGACAAAAGAGATCCCCAGCCCTGATGATG
 G [N] Y T L R V D C T P L L Y Q L V Y K L T K E I P S P D D G
 1530 GGTTGAGAGTAAATCACTGTATGAAAGCTGGTTGGAAAAAGACCCCTTCACCTGAAAAATAAAAATTTGCTTAGAATCAATAAGCTGGGAT
 F E S K S L Y E S W L E K D P S P E N K N L P R I N K L G S
 1620 CTGGAAGTGACTTTGAAGCTTTATTTTCAGAGACTTGGAAATTGCTTTCAGGCAGAGCCCGTTACACTAAGAATAAGAAAACAGATAAGTACA
 G S D F E A Y F Q R L G I A S G R A R Y T K N K T D K Y S
 1710 GCAGCTACCCAGTGACCACACAAATTTATGAGACATTTGAAFTGGTAGAGAAAATTTATGACCCCAATTTAAAAAACAACTTTCTGTGG
 S Y P V Y H T I Y E T F E L V E K F Y D P T F K K Q L S V A
 1800 CTCAATTACGAGGAGCACTGGTATATGAGCTTGTGGATTCTTAAATCAATTCCTTTTAAATTTCAAGACTATGCAGAAGCTTTGAAAAACT
 Q L R G A L V Y E L V D S K I I P F N I Q D Y A E A L K N Y
 1890 ATGCAGCAAGTATCTATAATCTAATAAGAAACATGATCAACAAATTAACAGACCATGGAGTATCATTTGACTCTTATTTTCTGCTGTGA
 A A S I Y [N] L S K K H D Q Q L T D H G V S F D S L F S A V K
 1980 AAACTTCTCAGAGGCTGCTTCAGATTTTCATAAACGACTTATACAAGTTGATCTTAACAATCCCAATTCAGTCAGAGTGAATGATGACC
 [N] F S E A A S D F H K R L I Q V D L N N P I A V R M N D Q
 2070 AACTGATGCTCTGGAAGAGCAATTCATGCTCTCTTGGTTTACCAGGAAGCTGTTCTATAGGCACATCATATTTGCTCCCAAGTAGCC
 L M L L E R A F I D P L G L P G K L F Y R H I I F A P S S H
 2160 ACAACAAATATGCTGGAGAAATCAATTTCTGGAAATCTATGCTATCTTTGATATTGAAATAAAGCCAACCTCTGTTTGGCCCTGGAAG
 N K Y A G E S F P G I Y D A I F D I E N K A N S R L A W K E
 2250 AAGTAAGAAACATATTTCTATTGAGCTTTTACAAATTCAGAGCAGCAGGAACTCTGAAAGAGTATTATAGAAGGCTCTCAAGTGGCT
 V K K H I S I A A F T I Q A A A G T L K E V L .

FIG. 4 (CONTINUED 2)

AGCCATTAAAGGTGTTGCTTAAAGCTGTAGGATAAAATTCACCTTCTGTGATAAATTGAAAGCCAGGGGTGTTCTTAAACTCTTTTTCATGTC 2340
ATGTTTGTGATTATAGGCTTTTGGTCTTTTTCATCTGCAAAAGCCTTTCTTTTGTCTCTTTTAAAGCTTAATTAATTATATTAGCAAAAGTGT 2430
AATCTAAATGAAGTAAATAAACTCCTGTGTGGCAGAAAGTAAAGAAAAATTCCTAAATTATAGCAAGGAACATGAATTCCTCAGACATTGTG 2520
AGTGTGGGAATGTAAATGGTAAAAATCCTTTTGTGAAACAGTTTGGCAGTTTCTCTATAAAAGTTAAACATACACTTTTACTTTTAGGACTCC 2610
AGAAATCCACTTCTAGTTATTATTCAGAGAGAGGAAAAACAAATGATCACAGCAATACTTGTATGCATGTTTCATTGCAACTTAAAGCGT 2700
AAAAACCCCAAAATGTCCATCCACAGACGAAATGTATAAACGTGTGGTATCCATTACACAAATAGACTACTTACTACTCAGCAATAAAAAATGAA 2790
GTAACCTTTCATAAATGCAATATATTGCGCAGACATTGTTGAAGGAAAAAAGCCAGACAACTACATAAAAAATATGTTTCTATTTTAGA 2880
TGAAGTGGCAAACTAATCTGTAGTGTAAATAATTAGATTAGTGTGCTGGGCCAAGTGGCAGGTTGGGGAGGATGGCTGCCAAAGAAAGT 2970
ATGAGGAAACTTTCTCCAAATAGATGAGAAATTTTCCGTATCTTGTATCTGAGTGGCAAAATGTGAAACTTAAAAATATATATAAAAAATTTATTGA 3060
AAGAAAAATTAAAGCCTCAATAAACGTGATTATAAAAAAATAAAAAAAGG 3110

FIG. 5.

CGGCGGAGGGCCCGCCAGTCAAGGGTGTGGCGCCCGCCACCGTAAGGCTAGGCCGGAGCTTAGTCCTGGGAGCCGCTCCGTCG 90
CGGCGGTCAAGCGCCCTATCAGATTATCTTAACAAGAAACCACTGGGAAAAAATGAAATTCCTTATCTTCGCATTTTTCGGTGG 180
M K F L I F A F F G G
TGTTCACTTTTATCCCTGTGCTCTGGGAAAGCTATATGCAAGAAATGGCATCTCTAAGAGGACTTTTGAAGAAATAAAAGAAATAGC 270
V H L L S L C S G K A I C K N G I S K R T F E E I K E E I A
CAGCTCTGGAGATGTTGCTAAGCAATCATCAACCTAGCTGTTTATGTTAAAGCCAGAACAGATCCTATGAGCGATTGGCACTTCTGGT 360
S C G D V A K A I I N L A V Y G K A Q N R S Y E R L A L L V
TGATACTGTTGGACCCAGACTGAGTGGCTCCAAGAACCTAGAAAAAGCCATCCAAATTAATGTACCAAAACCTGCAGCAAGATGGGCTGGA 450
D T V G P R L S G S K N L E K A I Q I M Y Q N L Q Q D G L E
GAAAGTTACCTGGAGCCAGTGAATACCCCACTGGGAGAGGGGAGAGAAATCAGCTGTGATGCTGGAGCCAGAAATTCATAAGATAGC 540
K V H L E P V R I P H W E R G E S A V M L E P R I H K I A
CATCTGGGTCTTGGCAGCAGCATTTGGGACTCTCTCCAGAGGCAATTACAGCAGAGTTCTGGTGGTGACCTCTTTCGATGAATGCAGAG 630
I L G L G S S I G T P P E G I T A E V L V V T S F D E L Q R
AAGGCCTCAGAAAGAGGGAAAGATTGTTTATTAACCAACCTTACATCAACTACTCAAGGACGGTGCAATACCGAACCGCAGGGGC 720
R A S E A R G K I V V Y N Q P Y I N Y S R T V Q Y R T Q G A
GGTGAAGCTGCCAAGGTTGGGCTTTGGCATCTCTCATTCGATCCGTGGCCCTCTTCCATCTACAGTCTCACAACAGGATTCAGGA 810
V E A A K V G A L A S L I R S V A S F S I Y S P H T G I Q E
ATACAGGATGGGTGCCAAGATTCCAACAGCTGTATTACGGTGAAGATGCAGAAATGATGTCAAGAAATGGCTTCTCATGGGATCAA 900
Y Q D G V P K I P T A C I T V E D A E M M S R M A S H G I K
AATTGTCATTACGTAAGATGGGGCAAAGACCTACCCAGATACGTATTCCTTCAACTGTAGCAGAGATCACTGGGAGCAAAATATCC 990
I V I Q L K M G A K T Y P D T D S F N T V A E I T G S K Y P
AGAACAGGTTGTACTGTCAGTGACATCTGGACAGCTGGGATGTTGGCAGGGTGCCATGGATGATGGCGGTGGAGCCCTTATATCATG 1080
E Q V V L V S G H L D S W D V G Q G A M D D G G G A F I S W
GGAAGCACTCTCACTTATTAAGATCTTGGGCTGCTCCAAAGAGGACTCTGGGCTGTGTCTCTGAGCTGCAGAAAGCAAGGTGAGT 1170
E A L S L I K D L G L R P K R T L R L V L W T A E E Q G G V

FIG. 5. (CONTINUED)

1260 TGGTGCCTTCCAGTATTATCAGTTACACAAGGTAAATATTTCCAACTACAGTCTGGTGATGGAGTCTGACGCAGGAACCTTCTTACCCAC
G A F Q Y Y Q L H K V N I S N Y S L V M E S D A G T F L P T

1350 TGGGCTGCAATTTCACGTGGCAGTGAAGGCGCCAGGCGCCATCATGGAGGAGGTTATGAGCCTGCTGCAGCCCTCAATATCACTCAGGTCTCT
G L Q F T G S E K A R A I M E E V M S L L Q P L N I T Q V L

1440 GAGCCATGGAGAGGGACAGACATCAACTTTTGGATCCAAAGCTGGAGTGCCTGGAGCCAGTCTACTTGATGACTTTATACAAGTATTTCTT
S H G E G T D I N F W I Q A G V P G A S L L D D L Y K Y F F

1530 CTTCCATCACTCCCGAGAGACACCATGACTGCTCATGGATCCAAAGCAGATGAATGTTGCTGCTGCTGTTGGGCTGTTGTTCTTATGT
F H H S H G D T M T V M D P K Q M N V A A A V W A V V S Y V

1620 TGTTCAGACATGGAGAAATGCTGCCCTAGTCTCTAGAAACAGTAAGAAAGAAACGTTTTCATGCTTCTGGCCAGGAATCCTGGGCTCTGC
V A D M E E M L P R S .

1710 AACTTTGGAAAACTCCTTTCACATAACAATTTTCATCCAAATTCATCTTCAAGCACAACTCTATTTCATGCTTCTGTTATTATCTTTCT
TGATACTTTCCAAAATTCCTGATTCTAGAAAAAGGAATCATCTCTCCCTCCCTCCACACATAGAAATCAACATATGGTAGGGATTACAG

1884 TGGGGGCATTTCTTTATATCACCTCTTAAAAACAATTGTTTCCACTTTTAAAGTAACACTTAATAAAATTTTGGGAAGATCTCTG

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FIG. 6.

NAALAD I
 NAALAD L
 NAALAD II
 NAALAD IV

MNLHETDSAVATARRPRMTCAGAVLA-GGFFLGLFLGFWPIKSSNEATNTPKHNK-AFTDSTKSENKFKFYNTQIEHLAGEQ
 -----MOWTKVLGLGGAALGLGILGHFAIPKKANSLAP-----QDLDEHLETVAGPDHHPENDRELSEHLLASPR
 -----MAESRRLYEMMCIAAALASFLGFMVGWFIKPLKETTSVRYHQSHRWKLVSSEKAKENKSFIRSPFKLEHLAGEQ
 -----MKFLIPAFFGVHRLSLCSGKALCKNGISKRTPEEIKKEIASCGDAAKAIINLAVYGKAQNRSYERLALLVDIVGERLSESKN

NAALAD I
 NAALAD L
 NAALAD II
 NAALAD IV

MFCIAKCIQSOMT--PESLDEVEAHVDVLSYPNKTHPMYIISTINEDGNEIPNTSLFPEPPEPEYENVSDIVPEPSA9POQMPEDAVT
 PEDIVQLLQORNDPESLDSAEAXTEVLSFPSSCEQPHVADIVGETGGIHSCHRTENVUTESEGGPDVUCYAAVAP9CTPSLUT
 NPLAKKIOTOMK--KFSLDSAKVHDVLSISTENETNAMYISIDHEHETEIFKTSYLEPEPEDEYENVTHLPPNMFSAQCEMPEDDUT
 LEKAIQINYNLQ--DGLKVKVDEPVRIHPHWERGSESAMVPEPAHKIALGLGSGICTPEE-----

NAALAD I
 NAALAD L
 NAALAD II
 NAALAD IV

VNYARTDFEGERDKINSGEATVAPYEKVFRCNEVKNQAQACAKVILLSDPADYEAPGKKS--KPDENMTFGGGVDPRENTINLNG
 AHRG-APEDPRELQTOGKLESNTATTPAGGGRGAFVHAHKSVAEVLVYDEALINDGLSDDETEPNSTLPEPSGVVERGSYYEY--
 VNYARTDFEGEREGINCKEKLVIAPSEKIFRCNGVURUMLAFAELILLSDPADYEAPGQF--YHKEANTLGGTAAQRENTINLNG
 -----ITAEVLNVTSPDETORPASE-ARCK-----LUVINQEIYINYSRTVOY--RTQEAVEAAKVGALASGIR.SVA

NAALAD I
 NAALAD L
 NAALAD II
 NAALAD IV

AGDPIFGYBPANETALRRGTAPAVSHPISIEVHEIGYDAKLTLEKVGESAPEDSSWRRESIKVPEINVERPFTGNF---STQKMKYHHS9TN
 FGGDLTPYLPAPVSSPRVDIPANVSSEPEPIFTQIGFQDARDLTCMNETLAE-ATQFALGCHYRLGEGRRPDGDFPADSQINYSYNRL
 ASDPLTPGYEKEXTERLDNEGVSEPIRIE VHEISANDABILLRYLGLIAPEDKSMKCAINVSYSIGEGTGS9D---SPRKURPHYNIN
 SFSIYSPTGIQEAQD-----ENKIPITACITVEDADYMSRMASHGKIKIVIOLMGAKTYPDTS9-----

similar to bacterial Zn²⁺ dependent peptidase

NAALAD I
 NAALAD L
 NAALAD II
 NAALAD IV

EYTRIMHISTLRCAVEPRDRLVIGCHRDSD--VP-EGIDFCEFAVWHHEIVVSFTTEKKET--HREKRTILFPASMDDEEPGLGSGSEMARE
 EMANSSIMULGIHRAVEPRDRLVYCNHRDSD--WH-SAVDESESTAVILELSRVLTGLKKEHRRRRSIVPASGABEEFGLIGSTEEFTTEE
 KTRIZMUVETIRSVNEPRDRLVLSCHPDSD--WP-SAIDNESAVIOEIASPFEKMSKE--HRRRTIIPASMDABEERGLGSGSEMARE
 -----EHTVAEITFSKYEEQVWVNSCHLDSDMDGQAMLDGSEA---PISWEALSLIKDIE--LRPKRTIRLVLTABEECGUCAPDYV--

FIG. 6. (CONTINUED)

NSRLQBRGVAYIAESHEGNYLRVDCFTLXSYSHNLHKLKSPDECFEGKSLYESWTKKSPSEFSGIPRI SKLGSENOFEVSPQR 527
 FPNKQZERTVAJINGEISKPAJATLURVOGTEPQSVPSAHEIRSEGPDLSDYDNMIRYFNRSSEVYGLRSTGSGAESSVAPSEVHF 519
 NVRLQBRSHAYIISDSHEGNYLRVDCFTLXSYSHNLHKLKSPDECFEGKSLYESWTKKSPSEFSGIPRI SKLGSENOFEVSPQR 517
 LHKXNISNYSLVNESDAGTFLPTGLOFTG----- 378

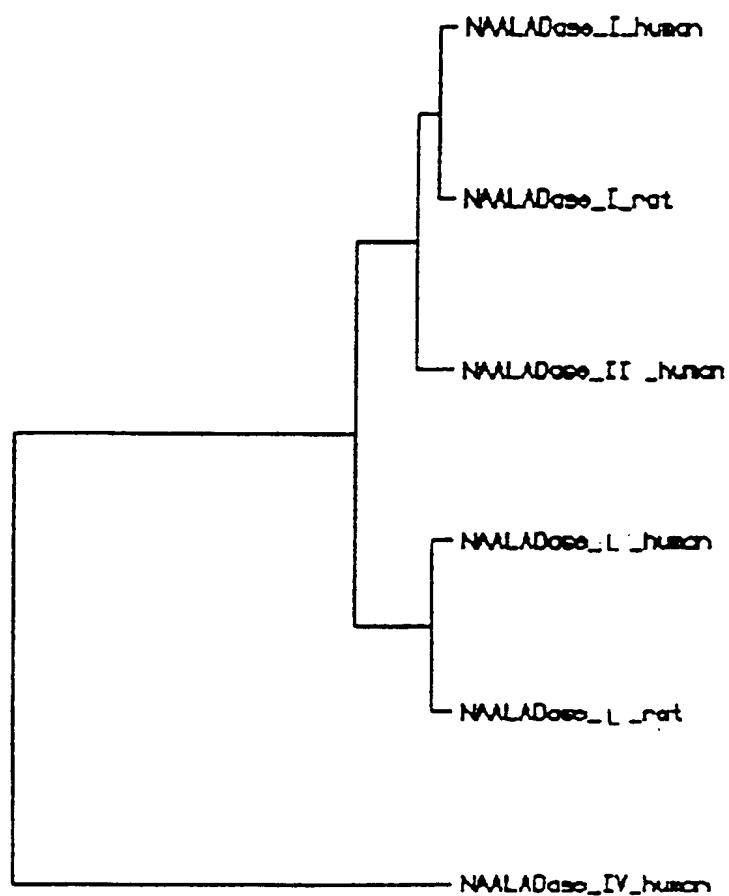
UGIASGRARZUKKMETNKFSGVPLHSHVYETVELMERTVDEPMFKYHITVQVREGVWEELANSI VEFDCRQSAVUTRKAADKIYSISMK 617
 LGISBMDIAYVYRSKTSARLPTHTAFDFTDYDKRDEGFSHSHOAVARTASSTILRISDSFFMLKVSQVSETHSPLOAAQODLGA 609
 UGIAEGRARZUKKTKDKYSSVYHTIYETPELMEKEVDEPKKOTSVQIRCALVLEVDSEKIMFNICQAEAEIKENLAASIYNLSKK 607
 -----EKARAIMSEUMSLICEINITQVLSHGEGTDINMWTQAGVPGASLDDLYKYFFFFHHSHGDTTLYVM 443

HPQRTKTYSVBDSMFESHVKRTZIASKFSSTQDFDKS--NRIVLFRHNDQMLRFBAPFTDGLGLDRERARRHVDZAEPSHKNKYAGESF 705
 ---LLEQHSISLGPVYVVERKEAEAAALGQHTSTLQKGSPEDEQVRMLNDQMLRFBAPFTDGLGLDRERARRHVDZAEPSHKNKYAGESF 693
 HDQQLTQHGVBDSMFESHVKRTZIASKFSSTQDFDKS--NRIVLFRHNDQMLRFBAPFTDGLGLDRERARRHVDZAEPSHKNKYAGESF 695
 DPKQNNVAAAUVAVVSYVADMEMLPRS----- 472

BGIYDALLFDIESKVDESKATGCHKQYVYAAFTVCAALAEPTSEVA-- 750
 BGLSNACSRARDTASGSEKAEVQVQVSHVUTAMEGAAATPRVADL 740
 BGIYDALLFDIENKANSRLLAKVYKHSHIAAFTICAAAGTIRENL-- 740

FIG. 7

Growtree Phylogram of: naaladase_short_distances, Tree Tree_1
June 17, 1998 17:46



09/743642

FIG. 8.

NAALAD I 376
 NAALAD L 366
 NAALAD II 367
 NAALAD IV 289
 APE 3 yeast 313
 P96152 199
 AMPX vibpr 202
 APX Strgr 84

DAQKLEKMGSAAPPD--SSURGSLKVPINVGPGFTGNF---STQKVKEHHIHSSTNEVTRIYNVIGTIRCAVEPDRYVILGG
 DAEILLRYLGGIAPPD-KSUKGALNVSSIGPGFTGSD---SFRKVRHNVNINKITRIYVVGITIRGSVEPDRYVILGG
 --RDLCNLTNGTLAP--ATUQALGCHYRLGPGFRPDGFPADSQNVSVNRLRLNRSVULGIGIRGAVEPDRYVILYEN
 SPHTGJQEQDGVPKIPTACITVEDAEHNSRMASHGK---IVIQLKCAKTYPDTS--FNTVAELTCSKYPEQVVLVSG
 -----TKHTVATGVPYKVGGKLIANIALNIDYSLYFANDSYVEFIKTQNIADTKHG-DPENIMVILGA
 QITNTIRALSSFNRRFYTTASGAQASDMLANEURSLIS---SLPGSRTEQIKHSGYNQ-KSWLTIQFSEKPDDEVIVGG
 QITGTUSSLESFTNRFYTTTSGAQASDMLASEVQALSA---SLPNASVQVSHSGYNQ-KSWNTITSEAPDETHVIGG
 -----NNGGNR--AHGRPGYKASVDYVKAKLDA--GYTTTLQOFTSGGATG-YNLIANUPGG-DENKVLTAJA

NAALAD I 419
 NAALAD L 429
 NAALAD II 432
 NAALAD IV 352
 APE 3 yeast 375
 P96152 270
 AMPX vibpr 273
 APX Strgr 147

HRDSU-WF-----C-CI-DPQSG-EAV-VHEIVRSFCTL-KKEG-WRPRRTILFASMDAEFFGLGSGTEMA-EE-NS
 HRDSU-WF-----S-AI-DPTSG-VAV-LCEIASFCKL-MSKG-WRPRRTILFASMDAEFFGLGSGTEMA-EE-NV
 HRDSU-WH-----CAV--DPSEGTAVL-L-ELSEVULGTLK-KGTWPPRRSIVASMGREEFFGLGSGTEFT-EEFFN
 HLDSUDV-----SCAMDDGGF-AFISU-EALSUI-----KDLG-LRPKRTLRVLMTREECGGAGAFQY-QLHKV
 HSDS---VEE-----SPGINDDCEGTISL-L-NVAFQLTH-----FKINNKVRFAVMAHEEGLGSGNFAYNLTK
 HLDSST-LGSHTNEQSIAPCADDASGIESL-S-ETIIRVL-----RDNN-FRPRKSAALMAVMAHEEVGLRGSQDPA-NQYKA
 HLDSST-LGSHTNEQSVAPCADDASGIRAV-T-EVIRVL-----SENN-FQPKRSIAFMAVMAHEEVGLRGSQDLA-NQYKS
 HLDS---VSS-----SACINDNCGESAAY-L-ETALAV-----SRAG-YQPDKHLRFAVMAHEEGLGSGKFFV-NNLPS

NAALAD I 516
 NAALAD L 506
 NAALAD II 508
 NAALAD IV 404
 APE 3 yeast 435
 P96152 327
 AMPX vibpr 330
 APX Strgr 210

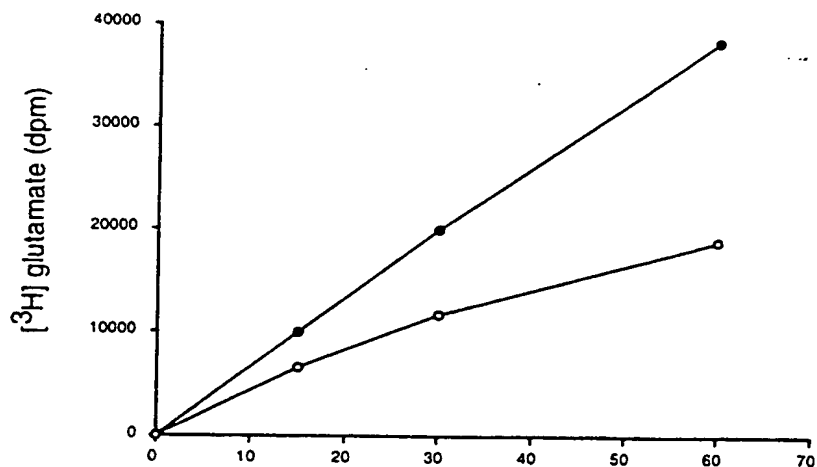
RLLQEEGVAYINADSSI-EGNYTLRVDCTPLNYSVLVHNLKECKSPDEGFECKSVYESMTKKS---PSPEFSGMPRISKLG
 KILQERSIAYINADSSI-EGNYTLRVDCTPLLYQLVYKLTKEHPSDDGFECKSVYESMLEKD---PSPENKNLPRINKLG
 KL-QEETVAYINADISV-FANATLRVQGPVQSVVFSANKEIRSPGPGD---LSIYDNQIRYFNRRSSPVYGLVPSLGSLS
 NIS--NYSLVMESEAGT-FLPTGLOFTGSEKARA---INEEVM-----SLQPLNITO-----VLSHG
 ENSKIR--VFNDYDHMA-SPNVEYEDYANNKENP--KGEEEKK---NMVVDVYKAH-----HLNYTLVPFDG
 QGK--KQVSVLQDLMNIRGSAEDINFIDYDTS---NLQFQIT---THIDEVLPEL-----TYG-----YDRCE
 EGK--NVVSAIQDLMNIRYKGSADVWFIDYDTS---NFIQVLT---QLMDEVLPSL-----TYG-----FDTCE
 AD-RSELAGYINADSI-IGSPNPGYFYDDDPVIEK--TFKNYFAG-----LNVPTETE-----GDGRSDHAPFKN

FIG. 8. (CONTINUED)

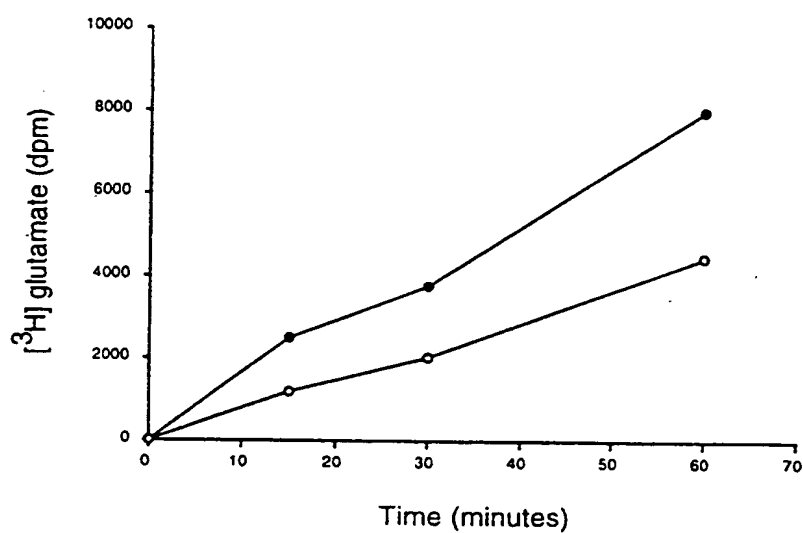
NAALAD I	★	SCNDFEVFFQRLG	IASGRARYT	TNUETNKF	SGYPLT	HSVYET	VELVEK	----	FYDPM	KYH	-LTV	QVRGG	----	582
NAALAD L		SGSDFEAYFQRLG	IASGRARYT	TNKKTDK	YSSYPV	HYH	FELVEK	----	FYDPT	KKQ	-LSV	QLRGA	----	572
NAALAD II		AGSDYAPFVHFL	ISSHDIAY	TYDRSKT	SARIYPT	YHJAFD	FDYVDK	----	FLDPG	SSH	-QAV	RTAGS	----	574
NAALAD IV		EGTDIN-F	IQAGVPGAS	LLDDLYKYFF	-----	FHSHG	DTHTVMD	PKQMN	VAAAV	AVVS	VVAD	MEMLPRS	----	472
APX 3 yeast		RSDYVGF	INNGIPAG	GIATGAE	NNVNGK	VLDRCY	QLCDDV	SNLSW	DAFIT	NTKLI	AHSVAT	YDJSF	EGFPKRETQKH	515
P96152		YACSDHAS	HKAGFSA	AMPFES	FFKDYN	-----	PKHMSQ	ULANS	DPT--	GNH	AVT	TKLGLAY	VIENAN	391
AMPX vibpr		YACSDHAS	HNAGYPA	AMPFES	FFNDYN	-----	PRHHTQ	ULANS	DPT--	GSH	AKQ	TQLGLAY	VIENG	394
APX strgr		VGVPVGGLE	TGAEYTK	SAAQAQ	WGGTAG	QAFDRC	YHSCD	LSN	INDTAL	DRNSD	AAAH	IUTLSS	GTEPPT	284

FIG. 9.

A



B



C

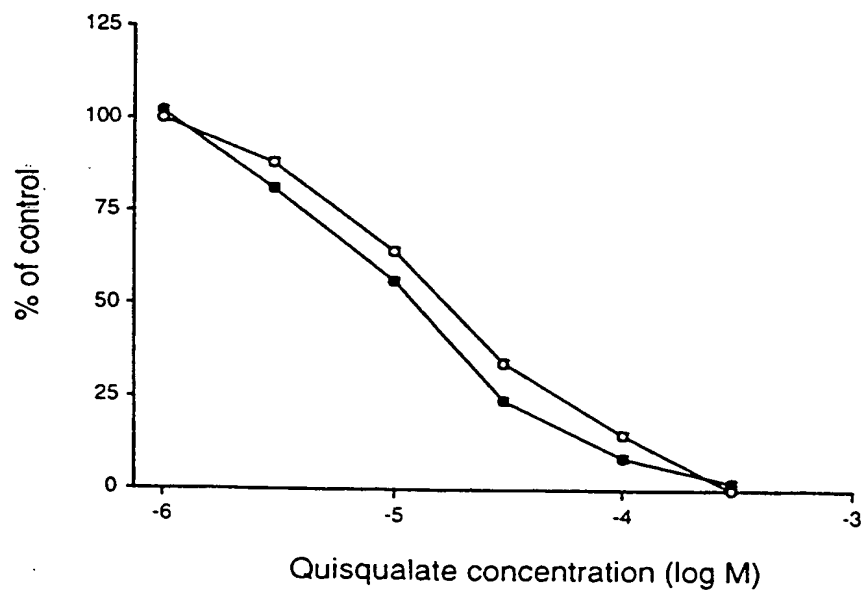
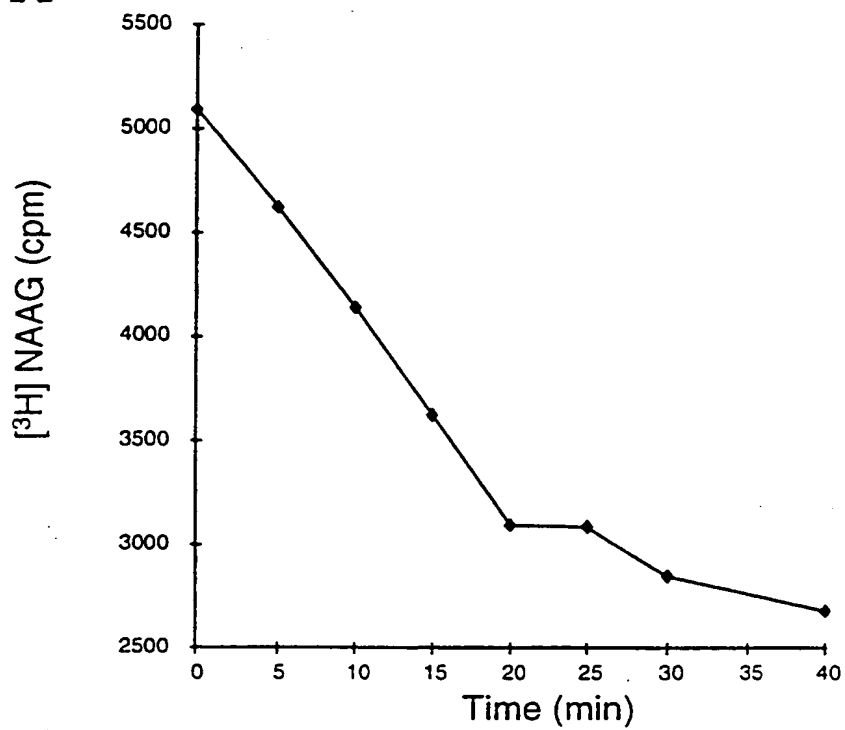


FIG. 10.

A



B

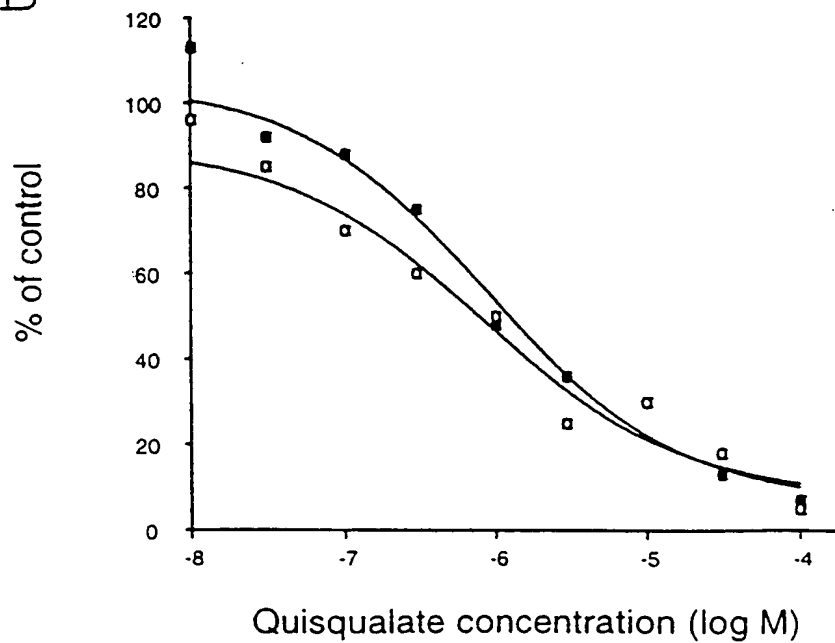
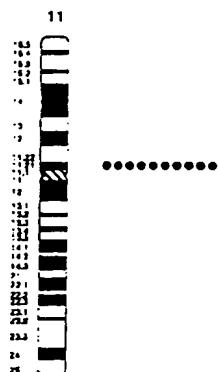
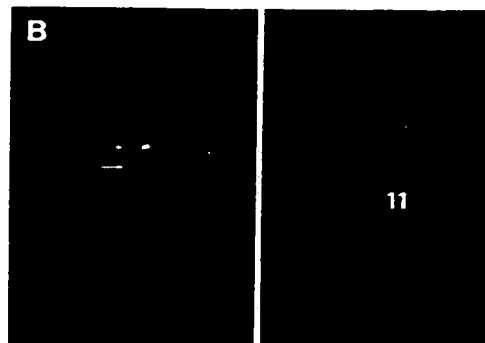


FIG. 11.

A



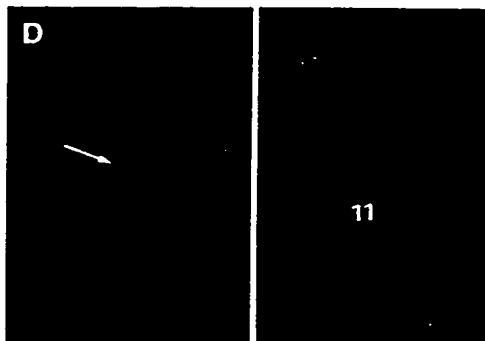
B



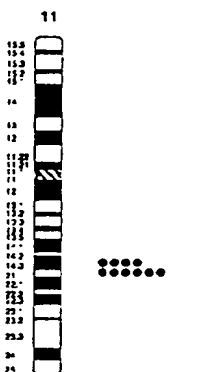
C



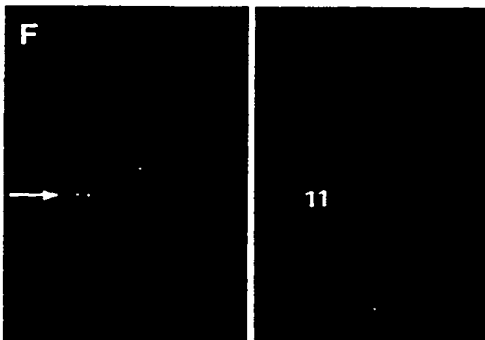
D



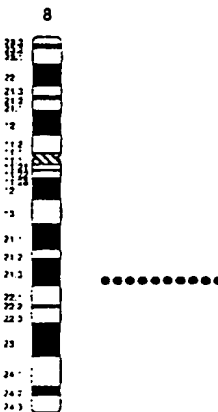
E



F



G



H

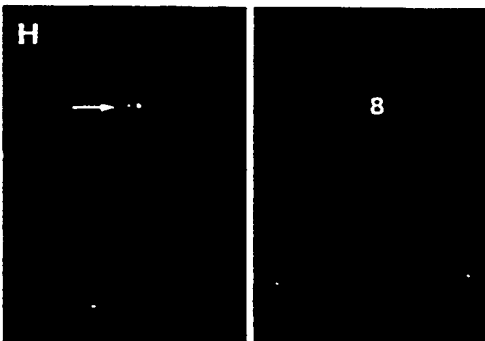
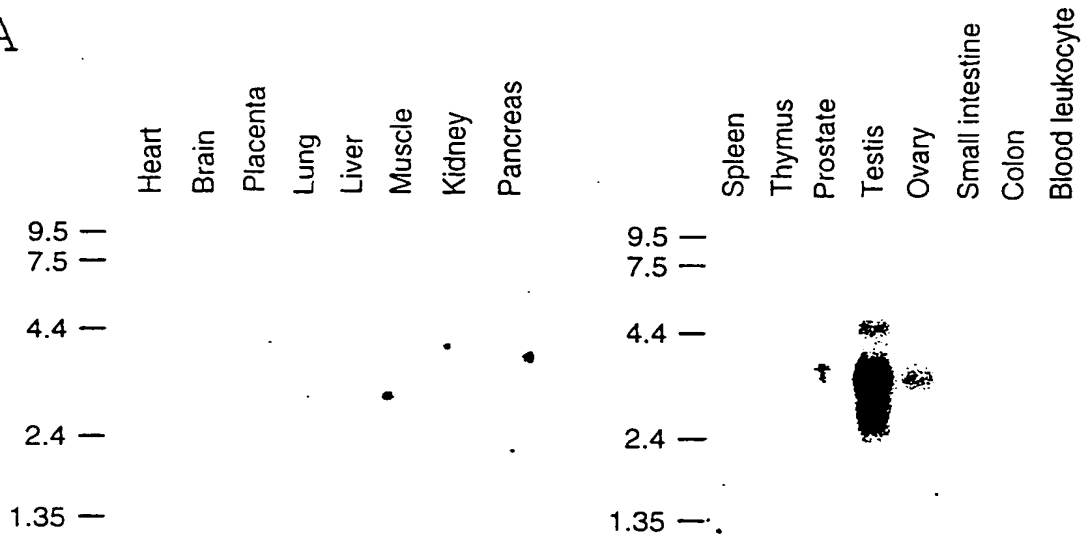


FIG. 12.

A



B

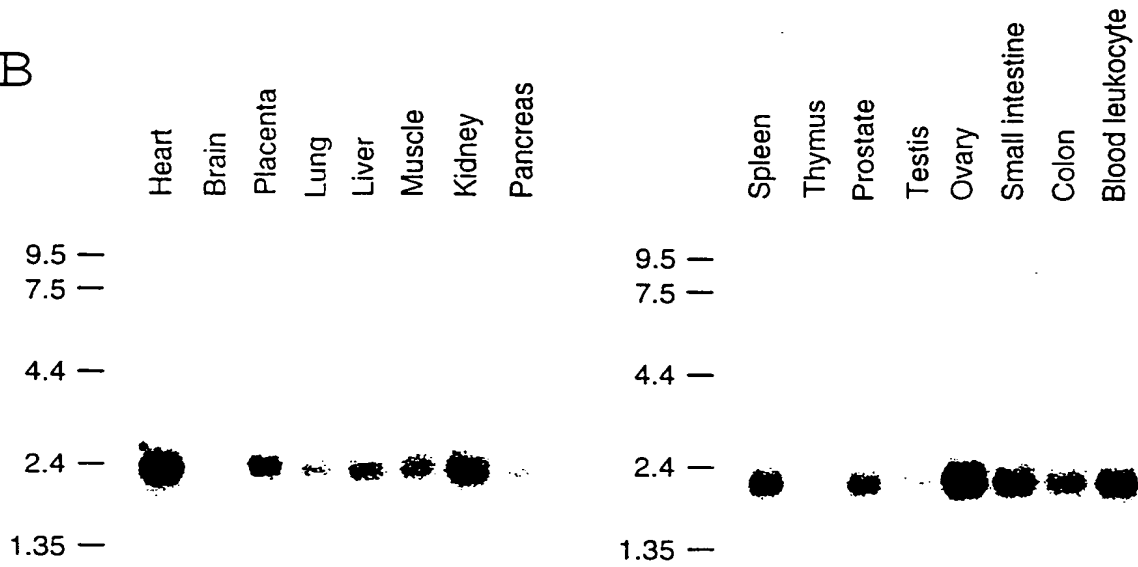
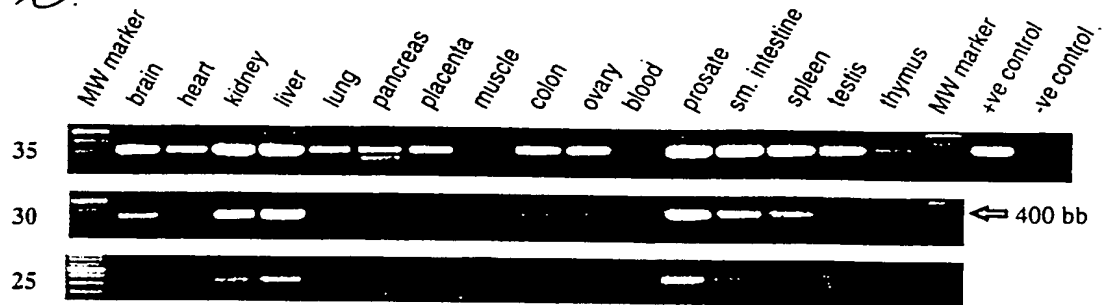
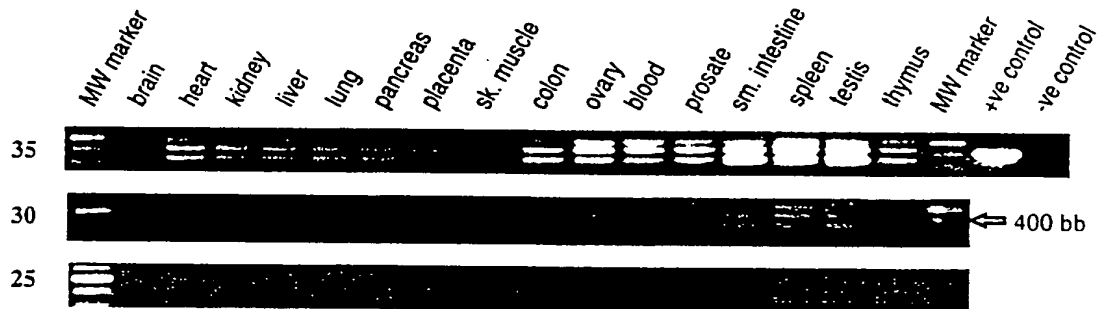


FIG. 13.

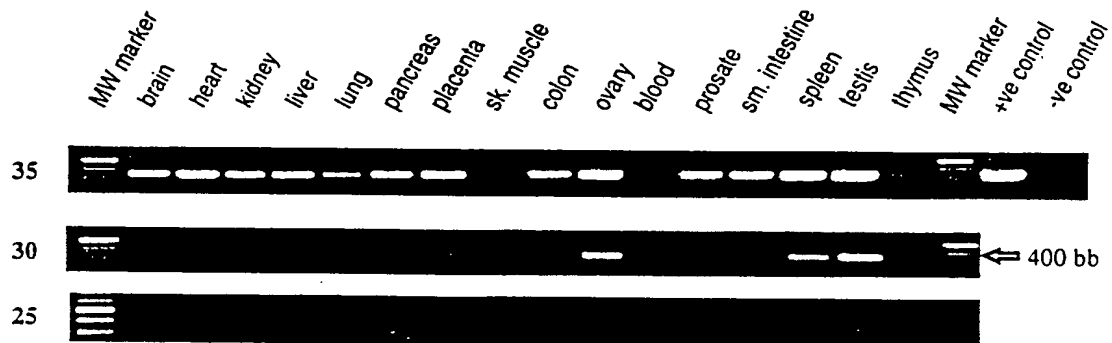
A



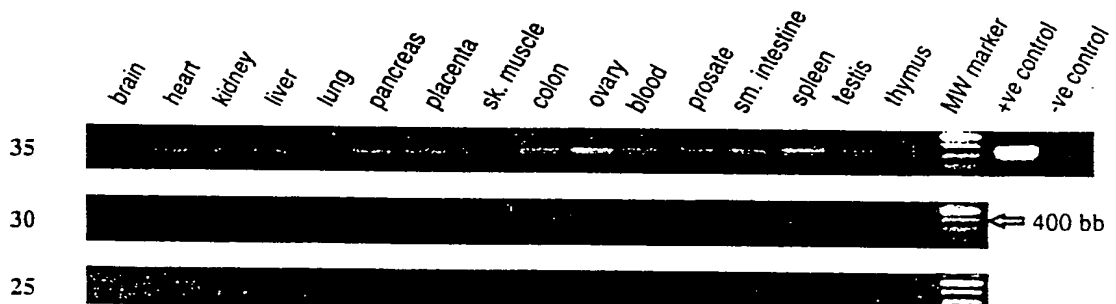
B



C



D



E

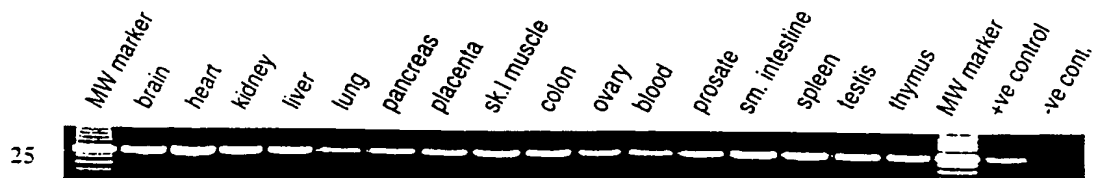
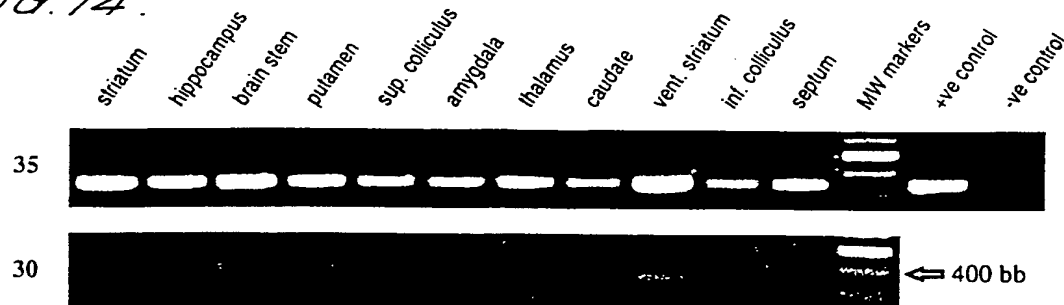
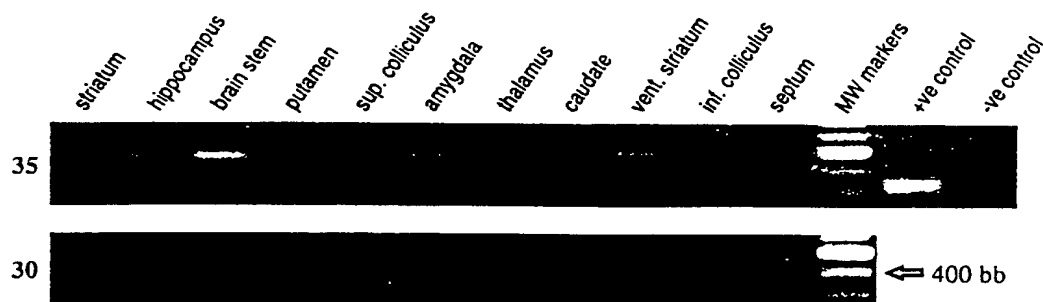


FIG. 14.

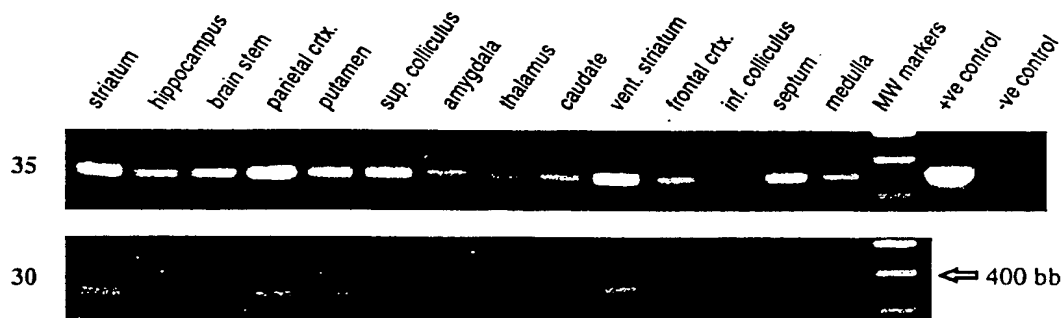
A



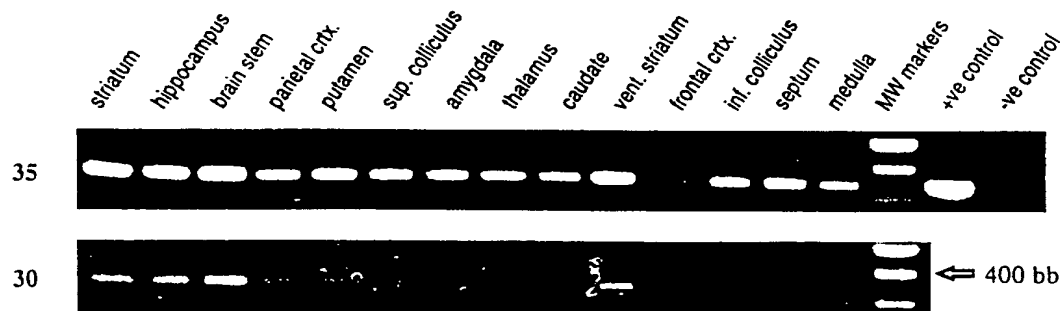
B



C



D



E

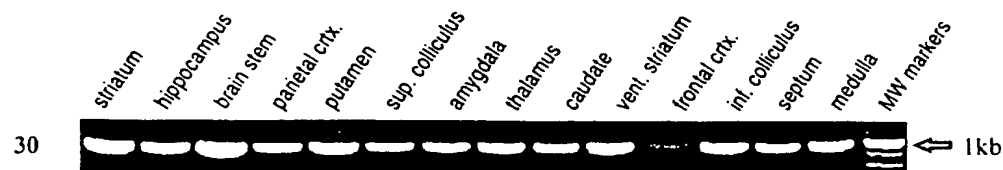


FIG. 15.

